User Guide

Seagate® Nytro™ XP6300 Flash Accelerator Cards

Nytro XP6302-8B2048
Nytro XP6302-8B1536

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Rev. A
December 2014

Revision History

Revision	Date	Description of Changes
Rev. A,	12/8/ 2014	Initial release.

Electromagnetic Compatibility Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables for SCSI connection external to the cabinet are used in the compliance testing of this Product. Seagate is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Seagate Technology LLC. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The Nytro WarpDrive Application Acceleration Card is tested to comply with FCC standards for home or office use.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction guide.

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Seagate Technology Support Services

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For Seagate reseller portal, visit: http://www.seagate.com/partners/my-spp-dashboard/

Chapter 1: Introduction

1.1 Overview

This manual describes the functional, mechanical, and interface specifications for the Seagate®Nytro™ XP6300 Series Flash Accelerator Cards. The Nytro XP6300 card is a block storage device. The card presents itself to the operating system through a Fusion-MPT™ interface as a single drive that requires minimal user configuration. You can use this card for either nonpersistent (for example, cache) or persistent (for example, database files) data.

The Nytro XP6300 card has a PCI Express® (PCIe®) interface that complies with the PCI Express Specification 3.0. The functionality of the Nytro XP6300 card comes from a SAS2308 I/O controller with Seagate Nytro firmware that runs on the internal processor.

The following table shows the characteristics of the Nytro XP6300 card models:

Table 1 Seagate Nytro XP6300 Card Characteristics Summary

Device Name	Model Name	Raw Capacity	Connector	Flash Controller	NAND Type	Card Style	Controller
Nytro XP6302	XP6302-8B2048	2048 GB	X8 PCIe 3.0	SF2582	Enterprise Multi-Level Cell (eMLC)	Half Height, Half Length	SAS2308
Nytro XP6302	XP6302-8B1536	1536 GB	X8 PCIe 3.0	SF2582	eMLC	Half Height, Half Length	SAS2308

1.2 Features

This section lists the features of the Nytro XP6300 cards.

- Proven enterprise firmware stack
- Flash ROM for storing the BIOS and firmware
- Best-in-class read and write performance
- Average latency of less than 200 µs
- Low host burden – No static CPU and memory overhead
- Support for Windows®, Linux®, VMware®, and FreeBSD® operating systems
- Bootable
- PCIe 3.0 x 8
- Half height and half length
- PCIe standard low-profile bracket attached to card (full-height bracket ships in the box)
- LEDs for drive life and drive status
- High reliability with block-level, page-level, and die-level failure protection

1.3 Related Documents

Refer to the following documents for more information on the Nytro XP6300 card and related tools.

- *Seagate® Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*
- *Seagate® Nytro™ XP6300 Application Acceleration Card Quick Installation Guide*

Chapter 2: Installation

2.1 Quick Installation Instructions

You can use the quick installation instructions to install your Nytro XP6300 card, or you can see the next section if you need more detailed installation instructions.

To quickly install your Nytro XP6300 card, follow these instructions.

1. Unpack the Nytro XP6300 card and inspect it for damage.
2. Turn off the server, and remove the power cord.
3. Remove the cover from the server.
4. Insert the card in an available PCIe slot that supports at least 50 W of power.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The Nytro XP6300 card hardware installation is complete.

2.2 Hardware Installation Instructions

2.2.1 Card Retention, Shipping, and the PCIe Specification

The PCIe specification requires that add-in cards with a mass of greater than 350 grams must have additional card retention at the server level. Neither the connector nor the optional *hockey stick* feature described in the PCIe specification provides the required retention.

Server OEMs and ODMs are solely responsible for choosing and qualifying their own server and rack shipping solution. Seagate does not qualify the server and rack shipping solution and is not responsible for such solution or any impact to Seagate products.

Seagate will make available mechanical design collateral for its products, which may be used by server OEMs and ODMs to design retention features for their server products. Seagate information is provided AS IS only and Seagate does not certify any design retention features used by OEMs and ODMs.

Seagate does not perform server and rack shock and vibration testing of OEM and ODM products. OEMs and ODMs are solely responsible for any server and rack shock and vibration testing.

2.2.2 Hardware Installation Steps

1. **Unpack the Nytro XP6300 card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the Nytro XP6300 card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact Seagate, or your reseller support representative.

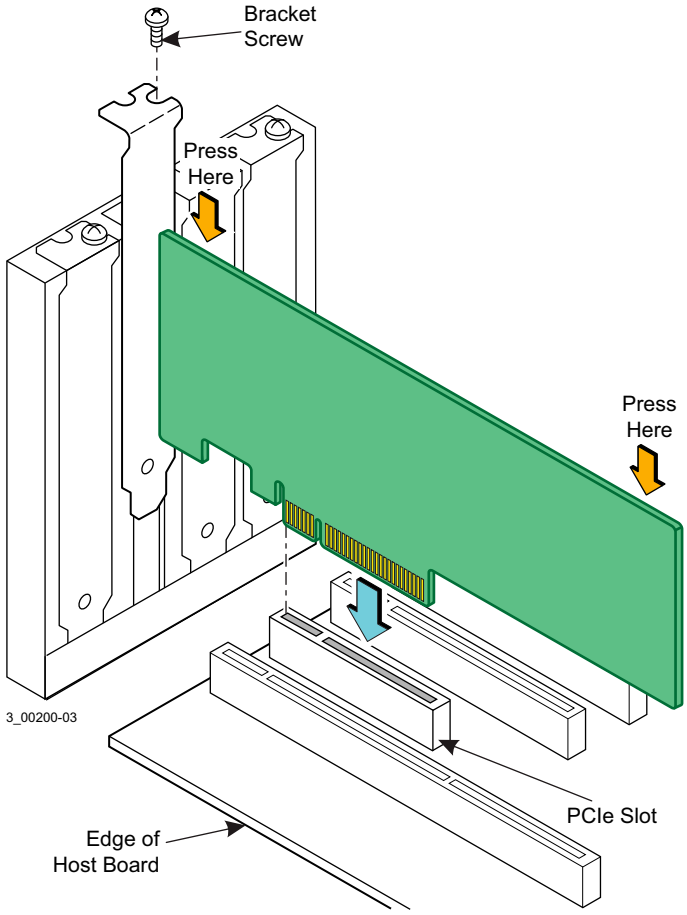
   NOTE Back up your data before changing your system configuration.

2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

   WARNING To avoid electrical shock, disconnect the server from the main power and from any networks before you install the card.

3. **Replace the PCI mounting bracket (system dependent).** If required for your system, replace the shorter PCI mounting bracket that ships on the Nytro XP6300 card with the full-height bracket supplied. Save the two screws from the short bracket and use the screws to attach the full-height bracket.
4. **Insert the Nytro XP6300 card in an available PCIe slot that provides at least 50 W of power.** Locate an empty PCIe slot. Make sure the PCIe slot provides at least 50 W of power. Without sufficient power the Nytro XP6300 card may be damaged or run at less than optimal performance. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable. Align the card to the PCIe slot. Press down gently, but firmly, to properly seat the card in the slot. The following figure shows how to insert the card in a PCIe slot.

Figure 1 Card Installation for the Nytro XP6300



NOTE The shape, size, and locations of components on your Nytro XP6300 card might vary from this illustration.

CAUTION For highest performance, make sure that the PCIe slot is PCIe 3.0 and make sure that it has an active width of dedicated eight lanes.

CAUTION The location must meet the 300 LFM (linear feet/minute) minimum airflow requirement.

5. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.

6. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.

The Nytro XP6300 card hardware installation is complete.

CAUTION For all server types, do not ship the Nytro XP6300 card installed or mounted inside a server. Ship the card separately and install the card into the server at its final destination. This prevents potential damage during shipment. If the card is shipped installed in a server and is damaged during shipment, the applicable warranty is void.

7. For highest performance, make sure that the PCIe slot is PCIe 3.0 and make sure that it has an active width of eight lanes or sixteen lanes.

CAUTION The location must meet the 300 LFM (linear feet/minute) minimum airflow requirement.

8. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.

The Nytro XP6300 card hardware installation is complete.

2.3 Software Installation Instructions

2.3.1 Windows Driver Installation

The Seagate drivers for Windows Server® 2012 (x86) are available online.

Download the latest Windows drivers from the Seagate website:

1. Go to the following Seagate website:
   http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/
2. Click on **Nytro XP6302 Flash Accelerator Card**.
3. Click **Support**, and click the driver you need.
4. Download the driver files.
5. Open the Windows Driver Configuration Utility file and follow the instructions to install the driver.

2.3.2 Linux Driver Installation

Seagate provides open source drivers in the following ways:

- Precompiled binaries to add to an existing installation using driver update disks or RPMs for selected distributions.
- Fusion-MPT™ source to add or update any distribution.

Download the latest Linux® drivers from the Seagate website.

1. Go to the following Seagate website:
   http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/
2. Click on **Nytro XP6302 Flash Accelerator Card**.
3. Click **Support**, and click the driver you need.
4. Download the driver files and install the RPM files.

2.3.3 FreeBSD Driver Installation

Download the latest FreeBSD® drivers from the Seagate website.

1. Go to the following Seagate website:
   http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/
2. Click on **Nytro XP6302 Flash Accelerator Card**.
3. Click **Support**, and click the driver you need.
4. Download the driver files and install the drivers.

2.3.4 VMware ESX4.X, ESX5.X, ESXi 5.X

Download the latest VMware® drivers from the Seagate website.

1. Go to the following Seagate website:
   http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/
2. Click on **Nytro XP6302 Flash Accelerator Card**..
3. Click **Support**, and click the driver you need.
4. Download the driver files and unzip. Install the drivers.

You have now completed the driver installation for the Nytro XP6300 card.

2.4 BIOS Boot Support Settings

The Nytro BIOS permits you to change the card properties. You can specify that the card is eligible for Seagate software control or that the card is reserved for control by software that does not belong to Seagate. You can select from the following settings in the Boot Support feature of the BIOS:

Enabled BIOS and OS permits the BIOS and the operating system driver to control the card.

Enabled BIOS Only permits the BIOS to control the card. The operating system driver does not control the card. Some operating system drivers (such as Windows drivers) do not support this option.

Enabled OS Only permits the operating system to control the card. The BIOS does not control the card with this setting.

Disabled prevents the motherboard from considering the card as a boot device. Therefore you cannot boot from the card. However, you can still see the card when you use the configuration protocol, and in all other respects, the card performs as usual. You can use this option when you have multiple cards in your system and you do not plan to boot from this card.

Changes to these settings display in the Status field on the main Adapter List menu. The new setting takes effect when the BIOS reloads when you reboot the system.

Selecting Disabled prevents the user from booting the card, but in all other respects the card will work the same.

2.4.1 Changing the BIOS Settings

To change the BIOS settings, follow these instructions:

1. At power-on, press Ctrl-C to log on to the BIOS screen.

NOTE The model number, date, and firmware number for your Nytro XP6300 card will vary from the illustrations below.

Figure 2 The BIOS Screen

Config Utility v110.00.00.00 (2013.05.20)
Adapter List Global Properties
Adapter PCI Bus PCI Dev PCI Fnc PCI Slot FW Revision Status Boot Order
NWD-BLP4-1600 05 00 00 06 110.00.00.00 Enabled 0
Esc = Exit Menu F1/Shift+1 = Help
Alt+N = Global Properties -/+ = Alter Boot Order Ins/Del = Alter Boot List

2. Press **Enter** to go to **Adapter Properties**.

Figure 3 The Adapter Properties Screen

3. To toggle between the **Boot Support** settings, use the **-/+/ Enter** keys.

Figure 4 The Disabled Boot Support Setting

4. Press **Esc** to exit the BIOS menu.

2.5 Managing the Nytro XP6300 Card

You can use the following tools to manage your Nytro XP6300 card:

BIOS This tool is available only during boot. Use this tool to view information about the card and to configure the boot support options. See BIOS Boot Support Settings.

DDCLI This menu-driven, command line interface tool permits you to view information, view the status, and flash upgrade the firmware for the Nytro XP6300 card. Refer to the *Seagate® Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*.

Chapter 3: Characteristics

This chapter presents characteristics for each Nytro XP6300 card.

3.1 Nytro XP6300 Card Characteristics

The Nytro XP6300 card uses a low-profile, half-height, and half-length PCIe board.

The Nytro XP6300card uses a SAS2308 controller with drive firmware that runs on its internal processor. The Nytro XP6300 card can be used for either persistent or nonpersistent data and offers high-performance with low latency and a low CPU burden.

The following figure shows the Nytro XP6300 card.

Figure 5 Nytro XP6300 Card

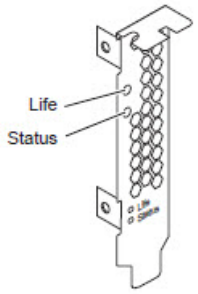
3.1.1 LEDs

Two board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for drive life and one is for drive status. The LEDs are labeled on the bracket.

3.1.2 Troubleshooting the Nytro XP6300 Card

The LEDs provide key status information to diagnose any problem with the Nytro XP6300 card. You can also contact Technical Support. The following figure shows the LED layout.

Figure 6 Nytro XP6300 Card LED Diagram



The following table shows LED Descriptions:

Table 2 Status Indicators on a Running System

Name	Color	LED Description
Life	Green	On, steady – Card has sufficient life remaining for programming and erasing the Flash memory. No action required.
	Yellow	On, steady – Card has approximately 10% or less of life remaining for programming and erasing the Flash memory. Plan for replacements.
	Red	On, steady – Card has no program or erase cycles left. Data can be read, but writes are at risk. Back up data and copy to a new Nytro XP6300 card.
Status	Green	On, steady – Normal.
		On, blinking – Lets the user locate a specific Nytro XP6300 card in a rack of servers.
	Yellow	On, steady – Warning. One of the following conditions applies: ■ Temperature warning. If this condition persists, you might damage your Nytro XP6300 card. Increase cooling for the card or shut down your system to prevent damage. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue.
	Red	On, blinking – Firmware fault code: ■ Run the `ddcli` utility to determine which component has an issue. ■ If no information appears, reboot the system and retry. ■ If no information appears, contact Seagate Technology Support Services.
		On, steady – One of the following conditions applies: ■ One or more SSDs failed (IT mode). ■ At least one SSD has exceeded its temperature. ■ Failed RAID volume (DD mode). ■ No RAID volume is configured (DD mode). ■ Backup power store failed. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue. If no information appears, reboot the system and retry the utility (DD mode).

If you experience a problem with your Nytro XP6300 card that you cannot resolve, report it to your FAE or, if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the revision level of the Nytro XP6300 card. To view this information, use the `ddcli` command, Option 1.
- Report the part number listed on the label, and clearly identify the board revision.
- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

3.1.3 Power Consumption for the Nytro XP6300 Card

The Nytro XP6300 card receives power from the PCIe 12-V power rail.

Use the following data for power consumption.

Table 3 Power Consumption

Idle	Typical Power I/O	Maximum Power I/O
21.1 W	36.2 W	37.2 W

NOTE Typical power I/O was measured at 8-KB, random access, 30% write, 70% read, Queue Depth (QD)=32/SSD. Maximum power I/O was measured at 4-KB, random access, 70% write, 30% read, QD=32/SSD.

3.1.4 Thermal Considerations

The board is designed to operate in an environment defined by the following parameters:

- Temperature range: 5 °C to 45 °C
- Relative humidity range: 5% to 90% noncondensing
- Maximum wet bulb temperature: 28 °C
- Minimum airflow: 300 LFM
- Relative humidity range: 20% to 80% non-condensing
- Operating altitude: 3000 m
- De-rate: 2 °C per 1000 m above 1000 m

The board is designed for the following storage and transit environmental parameters:

- Temperature range: –25 °C to 70 °C
- Relative humidity range: 5% to 95% non-condensing

3.1.4.1 Maximum Sensor Temperature

System design and cooling capacity variations can affect the actual airflow delivered to the Nytro XP6300 cards. System-level fan speeds might require adjustment to make sure that the Nytro XP6300 sensor temperature does not exceed the maximums. The maximum sensor temperature for the Nytro XP6300 cards is 76 °C.

3.2 Electromagnetic and Environmental Specifications

The Nytro XP6300 card is designed to minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The card carries the CE mark, C-Tick mark, Canadian Compliance Statement, KCC, HF, Taiwan BSMI, Japan VCCI, and FCC Class B, and the card is marked with the FCC Self-Certification logo. The card also meets the requirements of CISPR Class B.

3.3 Safety Characteristics

All Seagate PCIe boards meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are below the SELV 42.4-V limit.

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